to be described here. The impressions of the house, furniture, her family, the domestic animals, the family grindstone, the occupations of those about her, her own amusements and childish escapades, impressions of death, etc., all received through the sense of touch alone, and remembered most of them for many years till she learned to write and recorded them, show how independent of language of any sort all the fundamental psychic processes may be. So too the record of the daily events of her life at the Institute, which at certain periods is very full, her so-called poems, her religious impressions, etc., all bear at every point the marks of her defects both in the nature of her impressions and in the structure of her sentences and often her words, but also marvellous success in overcoming these disadvantages. Into Mr. Sanford's analysis of her graphic, syntactical, stylistic and perceptive errors we cannot enter here.

Ueber die optische Inversion ebener Linearzeichnungen bei einäugiger Betrachtung. Von Dr. J. Loeb. Pflüger's Archiv, 1887, p. 274.

An optical figure composed of seven straight lines may look like the contour of an open book and inclined at about the angle at which it would be held in reading, or by optical inversion its middle angle or edge may appear convex to the observer. Loeb tested children of from seven to fourteen years of age, who were told to hold a book as the figure looked to them, and found increasing the distance of the figure excited the concave, diminishing it, the convex, sensation. Absolute distance had nothing to do with the sensation. Even the movement of a pencil, which was not fixated but held between the eye and the drawing, from or to the former caused concave or convex sensations respectively. Slight movements of convergence are commonly associated with convex, and of divergence with concave sensations. Passive movement of the bulbus sometimes caused convergence. Monocular inversion Loeb thinks due to the innervation which changes the fixation point along the line of vision. The same rules hold of all figures susceptible of inversion.

Ueber einseitigen und doppelseitigen Lidschluss. Von O. Langendorff. Arch. f. Anat. u. Physiol., 1887, p. 144.

In man reflex, as distinct from voluntary, winking is always on both sides, but with the rabbit only the lid of the stimulated side winks. The visual field is less identified with the danger field in the rabbit, the eyes of which are on different sides of the head and have different fields, and which needs a strong stimulus to cause bilateral winking. Exactly the same law in man and in rabbits holds of the perfect reflex. Knoll could observe no sympathy of the unstimulated pupil. But it is rare that the voluntary shutting of one eye in man is so well learned that no tremor of the other lid can be observed, and the feeling is that this is due to antagonistic effect rather than to genuine inhibition.

Die Wahrnehmung der Schallrichtung mittelst der Bogengänge. Von W. Preyer. Arch. f. Physiol., 1887, Heft 11 and 12.

To determine how accurately the direction of a short sharp sound could be located with closed eyes and motionless head it was first

needful to determine fixed points in space which could be re-located with accuracy. This was done by means of a wire cap with 26 wires projecting at regular and equal angles in all directions from a point in the head about midway between tympana of the two ears. Each of these directions was carefully named, and to aid in their mental imagery for the subject of experimentation sticks were stuck in a billet of wood in the same directions, and solid wooden figures were made with a side to the plane of which each stick would be vertical. Each time there are thus of course 25 wrong guesses possible, or in all 650 errors. It was found, however, after many thousand experiments, that right and left were very rarely confused, location in the median plane was quite accurately determined, and when errors occurred here neither right nor left ever had preponderance. It was in this plane, however, that the greatest errors, sometimes amounting to 180°, occurred in judging locations front and back. The number and size of errors in the right and left field were surprisingly alike. Preyer assumes that the nerves of each ampulla have a specific energy of localization in space peculiar to themselves. Thus the horizontal canal is strongest stimulated by sounds in the horizontal plane, the upper vertical or anterior by sounds from front and above, and the lower vertical or posterior by sounds from behind and below—each according to its position in the head. That canal is strongest stimulated with the plane of which the direction of the sound (whether through the air and meatus, etc., or through the bones of the skull) makes the smallest angle. These sounds are confused when coming from positions where this angle is nearly alike for two canals. This in general the experiments confirm, although a few positions resist this interpretation. With one ear closed, feeble sounds far over into the field of the closed ear seemed on the side of the open one.

Ueber die Schrift von Schallbewegungen. Von Prof. HENSEN. Zeitschrift f. Biologie, 1886, Heft 3.

Professor Hensen's logograph (Sprachzeichner), the older form of which was described by Grützner in his *Physiologie der Sprache*, has been much improved upon by Hensen of late, and can now be had of his mechanic (Zwickert, Dänische Strasse, Kiel). It now represents better than has ever been done before the impulses which speech imparts to the ear. The curves are very small, but uniform for different pitches, and made by a membrane rigid enough to check after vibrations. That fine curves only a few hundredths of a millimetre long may be made legible and reproducible, it was necessary to warm the glass plate and smoke it over a gas jet so that the coat of soot upon it could just be seen. The mechanical difficulties encountered were great and have occupied Hensen off and on for fifteen years, but now are so far overcome that a pupil of his, Dr. Paul Wendeler, has graphically reproduced a number of consonant sounds with this apparatus, which are described and presented in magnified form in an article following the above. This apparatus seems at least to have one advantage over attempts to write directly from the tympanum or from artificial tympana, or over all such results as Fick has just described (Betrachtungen über den Mechanismus des Paukenfells, Verhandl. d. med. Gesellsch., Würzburg, 1886), in that its *eigenton* is mainly eliminated.